REMARKS

Reconsideration of the application is requested in view of the above amendments and the following remarks. Claim 4 has been amended. Claims 27-29 are canceled without prejudice or disclaimer. No new matter has been added.

§102 Rejections

Claims 4, 13, 14, 18, and 25-29 were rejected under 35 U.S.C. §102(b) as being anticipated by Zeuv (US 6,223,827). Applicants respectfully traverse this rejection. As noted above, claims 27-29 are canceled without prejudice or disclaimer, rendering this rejection moot as to those claims.

Claim 4 has been amended to clarify that the control of the ratio of mass flow rate of the liquid extinguishing agent to the mass flow rate of the pressurised gas towards a value that produces a desired droplet sized distribution is achieved by applying the pressure of the stored gas to the pressurised liquid extinguishing agent, whereby the reducing applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent. This controlled ratio produces a desired droplet sized distribution in and for substantially the duration of the discharge. These features are neither disclosed nor suggested by Zeuv. The teachings of Zeuv at column 3, line 66 to column 4, line 3 disclose only that the apparatus of Zeuv is capable of producing a predetermined droplet size. However, the predetermined droplet size is produced by an entirely different mechanism as compared to that which is acquired by claim 4 to create the desired droplet sized distribution.

Zeuv discloses at column 3, lines 7-13 that:

> compressed air under pressure of 300 Bar is supplied (Figure 1) from the gas bottle 2 through the pressure regulator 3 (gas reduction valve), to ensure a preset pressure level, through the hose 7 into the plenum of the vessel 1 contained water, the gas pressure is 6 Bar) and is then fed to the mixing chamber 8 (the gas pressure is 5 Bar) through the flexible hose 5 through the gas supply device 10.

Accordingly, throughout the majority of the operation time of the apparatus of Zeuv, the water in the liquid vessel 1 is maintained at a constant pressure of 6 Bar. In view of the fact that

the water in the liquid vessel 1 is maintained at a constant pressure, it can be assumed that the mass flow ration of the water from the liquid vessel 1 through the flexible hose 5 to the nozzle 4 remains substantially constant. Zeuv also discloses with reference to Figure 1 that the flexible hose 6 that supplies pressurised gas to the nozzle 4 is located downstream of the gas pressure regulator 3. At least for the majority of the operating time of the Zeuv apparatus, the pressure of gas applied from the gas cylinder 2 to the nozzle 4 will also remain constant.

The Zeuv apparatus appears to be specifically adapted so that the constant mass flow rate of the liquid (as described above) and the constant pressure and subsequent mass flow rate of the gas (as described above) result in the preset droplet size discussed at column 4, line 1 of Zeuv. This is supported by the description at column 3, lines 23-25 of Zeuv, which state that

> air pressure at the entry to the nozzle and the relative concentration of water in the 2-phase flow are chosen to obtain the optimum characteristics of the resulting 2-phase jet.

Accordingly, if in Zeuv, a desired droplet size distribution is obtained for substantially the duration of the discharge as recited by claim 4, this is achieved by utilizing a constant mass flow rate of the liquid in a constant pressure and mass flow rate of the gas. These and the other teachings of Zeuv discussed above fail to support the assertion in the Examiner's response to arguments in the present Office Action. The Examiner states that "if the gas in the compressed gas bottle drops below the desired 6 Bar, then the pressure leaving the compressed gas bottle will reduce during the flow thereof and consequently will reduce the pressure of liquid agent." Applicants submit that there is no such disclosure by Zeuv. Specifically, Zeuv fails to disclose what would happen if the gas pressure falls below 6 Bar. Furthermore, there is no disclosure in Zeuv that dropping the gas pressure below 6 Bar could even occur while maintaining the specific outcome recited as the invention in Zeuv.

Even if the gas pressure in Zeuv did fall below 6 Bar along with a corresponding falling liquid pressure, which Applicants do not concede is disclosed, there is no disclosure by Zeuv that such conditions would control the ratio of the mass flow rate of the liquid extinguishing agent to the mass flow rate of the pressurised gas towards a value that produces a desired droplet sized distribution, as recited by claim 4. As discussed above, the system disclosed by Zeuv is adapted so that the desired preset droplet size is achieved by maintaining constant gas pressure and constant liquid pressure. It is not at all clear from the Zeuv disclosure what would happen in the

Zeuv system if the gas pressure falls below 6 Bar. There is also no disclosure or suggestion that such a reduction in gas pressure would lead to the production of a desired droplet size. Therefore, Applicants strongly traverse the Examiner's assertion that such an effect would be inherent in the system of Zeuv in order to meet the limitations of claim 4.

Furthermore, if the gas pressure in Zeuv did fall below 6 Bar, which Applicants do not concede is disclosed by Zeuv, then such a pressure condition would only exist for a relatively short time period at the end of operation of the Zeuv system. Claim 4 requires that the control of ratio to produce the desired droplet sized distribution occurs in and for substantially the duration of the discharge. In contrast, the system of Zeuv uses a constant gas pressure and a constant liquid pressure for the majority of the operating time (at least during the time that the gas pressure decreases from 300 Bar to 6 Bar). Therefore, Applicants submit that Zeuv fails to disclose every limitation of claim 4 and the claims that depend from it for the several reasons discussed above.

Claim 18 is directed to a fire and explosion suppression method that tracks many of the limitations discussed above with respect to the apparatus of claim 4. Therefore, Applicants submit that Zeuv fails to disclose every limitation of claim 18 for at least those reasons discussed above related to claim 4. For example, claim 18 recites a step of controlling the ratio of the mass flow rate of the liquid extinguishing agent to the mass flow rate of the pressurised gas towards a value that produces a desired droplet sized distribution in and for substantially the duration of the discharge, and applying the pressure of the stored gas to pressurised liquid extinguishing agent whereby the reduced applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent. Zeuv fails to disclose at least these limitations of claim 18 for those reasons discussed above related to claim 4. Therefore Applicants submit that Zeuv fails to disclose every limitation of claim 18 and the claims that depend from it.

Claims 3-5, 7, 9, 12-14, 17-19, 21, 22 and 24-29 were rejected under 35 U.S.C. §102(b) as being anticipated by Dorkin (US 6,478,240). Applicants respectfully traverse this rejection. As noted above, claims 27-29 have been canceled, rendering this rejection moot as to those claims.

Claim 4 further recites "missed producing means connected to receive a flow of the liquid extinguishing agent at a mass flow rate thereof to produce a mist therefrom, for mixing the already produced mist into a flow of the pressurised gas to produce a discharge in the form of a

two-phase mixture comprising a suspension of droplets of the mist in the pressurised gas." Thus, the mist recited by claim 4 is already produced before it is mixed into the flow of the pressurised gas to form a two-phase mixture. Dorkin clearly fails to disclose this limitation.

In Dorkin, the production of the mist from the liquid and the mixture of the mist with the gas take place simultaneously. Dorkin discloses with reference to Figures 1 and 2 that water enters the mixing chamber 2 in the form of a water stream. Hence, the disclosure at the bottom of column 7 of Dorkin that reads with reference to Figure 1 that "the water streams entering the chamber 2 are immediately enveloped by the air flow," teach an arrangement different from that recited in claim 4. Similarly, with reference to Figure 2 of Dorkin, column 8, lines 61-64 refer to "a water flow in the form of thin streams due to its flowing through injection orifices made in the cylindrical wall 3." Hence, Dorkin teaches that there is no production of mist from the liquid before the liquid is introduced into the gas flow. Instead, liquid is introduced into the gas flow in the form of a liquid stream, which liquid stream is clearly not a mist.

Moreover, Dorkin also teaches that the production of a mist from the liquid is not achieved until after the liquid has been mixed with the gas flow. Dorkin discloses with reference to column 8, line 66 to column 9, line 7 that:

> The water streams entering the mixing chamber 2 are caught up by the air flow, in which an additional liquid dispersion and its mixing with gas takes place. As a result of the procedures in the chamber 2 described a two-phase flow is generated which then passes into the nozzle 1.

A similar teaching is found at column 7, line 67 to column 8, line 6 of Dorkin. Thus, Dorkin discloses that the mist and two-phase suspension of droplets from the mist and the pressurised gas are only formed after the liquid has been mixed into the flow of the pressurised gas. Dorkin discloses the use of sheer forces produced by the interaction of the liquid streams and the pressurised gas to generate the production of mist. This is a substantially different teaching from the limitations of claim 4 in which a mist is first produced and the already produced mist is then mixed into the flow of pressurised gas. Therefore, Applicants submit that Dorkin fails to disclose every limitation of claim 4 and the claims that depend from it.

Furthermore, Dorkin fails to disclose the control means recited in claim 4 that control the ratio of the mass flow rate of the liquid extinguishing agent to the mass flow rate of the

pressurised gas toward a value that produces a desired drop size distribution in and for substantially the duration of the discharge. Dorkin teaches with reference to Figures 1 and 2 a system that works in a similar way to the system of Zeuv described above. Specifically, the gas regulator 18 of Dorkin maintains the constant gas pressure that is used both to feed gas via the supply pipe 11 into the gas chamber 8, and also to supply gas via the conduit 17 into the liquid container 16 so as to pressurise the liquid. The gas regulator 18 is referenced at column 7, lines 18-20 of Dorkin as follows:

> air enters the reducer 18 controlling (decreasing) the pressure level in a particular range.

Additionally, column 9, lines 38-40 of Dorkin suggest that the gas pressure at the nozzle inlet P is maintained constant. Dorkin fails to disclose in any way applying a reducing gas pressure to the liquid so that the mass flow rate of the liquid correspondingly reduces to produce a desired droplet sized distribution in and for substantially the duration of the discharge. Dorkin seems to disclose that the gas pressure, the gas flow rate, and the liquid flow rate are all maintained constant by the gas regulator 18. Thus, Dorkin fails to disclose every limitation of claim 4 for this additional reason.

Claim 5 of the present application requires mist producing means connected to receive a flow of the liquid to produce a mist therefrom, and mixing means for mixing the already produced mist into a flow of pressurised gas to produce a discharge in the form of a two-phase mixture. Applicants submit that Dorkin fails to disclose this limitation of claim 5 for at least those reasons discussed above concerning the failure of Dorkin to provide a preformed mist into the flow of the pressurised gas.

Similarly, independent claim 12 requires mist producing means and mixing means for mixing the already produced mist into a flow of the pressurised gas. Applicants submit that Dorkin fails to disclose this limitation of claim 12.

Further, claim 12 recites "means for initiating the flow of the liquid extinguishing agent before initiating the flow of the gas." In contrast, Dorkin discloses the operation of an apparatus in a directly opposite manner. In both of the Dorkin embodiments, flow of gas is initiated before flow of liquid (e.g., see the Abstract of Dorkin that recites "the chamber is connected to a liquid and gas supply system through a controlled valve, wherein said valve ensures an early inlet of a gas flow prior to that of a liquid when the device is turned on"). Further reference is made at

column 7, lines 62-67 of Dorkin that "carrying out a required algorithm of liquid and gas supply allows to preliminarily supply the air flow and then the water flow". Further, column 8, lines 60-64 of Dorkin recite that "the device is turned on there takes place a preliminary supply of the air flow and then a water flow in the form of thin streams."

The fact that Dorkin discloses air flow is evident from Figures 1 and 2 of Dorkin. In particular, the closure member 5 of the gas compartment 8 is rigidly fixed to the push rod 7 (see column 5, line 35). On the other hand, the closure member 6 of the water chamber 9 is slidably mounted on the push rod 7 (see column 5, lines 36-37). Figures 1 and 2 also illustrate a spring 37 that biases the closure member 6 against the seat of the water chamber 9. As the push rod 7 is pushed to the left, as shown in the figures, the enclosure member 5 of the gas compartment 8 will lift away from the corresponding seat immediately causing the push rod 7 to move. On the other hand, the closure member 6 of the water chamber 9 initially slides axially along the push rod 7, under the influence of the spring 37, and so maintains its sealing contact against the corresponding seat 37. Closure member 6 does not lift away from its corresponding seat 34 until the stop member 12 contacts the closure member 6. In this way, the gas compartment 8 opens before the water compartment 9 and gas flow starts before the water flow. This construction and operation disclosed by Dorkin is directly opposite to the limitations of claim 12. Therefore, Dorkin fails to disclose every limitation of claim 12 and the claims that depend from it.

Claim 18, as discussed above, recites a step of controlling the ratio of mass flow rate of the liquid extinguishing agent to the mass flow rate of the pressurised gas to produce a desired droplet size distribution in and for substantially the duration of the discharge, wherein the controlling step includes the step of applying the pressure of the stored gas to pressurise the liquid extinguishing agent whereby the reducing applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent. These features are not disclosed by Dorkin for at least those reasons discussed above related to the limitations of claim 4. In particular, Dorkin discloses the gas regulator 18 maintaining a constant gas pressure applied to the liquid container 16. As a result, the flow rate of the gas through the gas supply pipe 11 of the gas compartment 8, and the flow rate of the liquid through the liquid supply pipe 10 to the liquid chamber 9, remains constant throughout the majority of the operation. There is no disclosure by Dorkin of any other way to operate the apparatus. In particular, there is no disclosure of operating the Dorkin apparatus so that the gas flow rate and the liquid flow rate decrease at corresponding rates so as

to maintain a desired droplet sized distribution in and for substantially the duration of the discharge.

Applicants respectfully traverse the Examiner's comment that "the use of the apparatus of Dorkin inherently performs the steps and methods of the claims." Dorkin fails to disclose inherently or otherwise that the pressurised gas is pressurised by being stored under pressure that thus reduces during the flow thereof and reduces the mass flow rate of the gas. The gas regulator 18 of Dorkin maintains a constant gas flow rate of the gas throughout the majority of the operating time of the Dorkin apparatus. However, even if such a pressure reduction did occur in Dorkin, which Applicants do not concede is disclosed or inherent in Dorkin, there is no disclosure or suggestion in Dorkin that such a reduction would result in a desired droplet size distribution that meets the limitations of claim 18. There also is no disclosure, inherent or otherwise, that such a reduction would result in the production of a desired droplet size distribution in and for the substantially the duration of the discharge, because for the vast majority of the operation time in the Dorkin apparatus the pressure in the pressure container 15 would be greater than the target pressure to which the gas regulator 18 operates. Therefore, Dorkin fails to disclose every limitation of claim 18 and the claims that depend from it.

Dorkin also fails to disclose, inherently or otherwise, the step of "applying the pressure of the stored gas to pressurise the liquid extinguishing agent whereby the reducing applied pressure correspondingly reduces the mass flow rate of the liquid extinguishing agent," as required by claim 18. Thus, Applicants submit that Dorkin fails to disclose every limitation of claim 18 for this additional reason.

Applicants submit that Dorkin also fails to disclose every limitation of at least claims 7 and 19. With regard to claim 7, the rejection contends that the valve 20 of Dorkin constitutes "a controllable metering valve for adjusting the valve in dependence of the mass flow rate of the gas." Since claim 7 depends from claim 5, it appears that the rejection is asserting that the valve 20 of Dorkin is suitable for adjusting the mass flow rate of the liquid extinguishing agent during the discharge. Applicants submit that this is clearly not disclosed by Dorkin. The valve 20 of Dorkin is located before the gas regulator 18, which results in the gas pressure applied to the liquid container 16 and also applied to the gas compartment 8 being determined by the gas regulator 18 rather than the valve 20. Additionally, there is no disclosure that the valve 20 is actually operated in the way explained in the rejection.

As to claim 19, Dorkin fails to disclose "the controlling step includes the step of adjusting the mass flow rate of the liquid extinguishing agent during the discharge." The gas regulator 18 disclosed by Dorkin maintains a constant gas pressure applied to the water container 16 via the conduit 17. Accordingly, the mass flow rate of the liquid will be constant and will not be adjusted as required by claim 19. It is further noted that claim 19 requires that the adjustment of the mass flow rate of the liquid is included as part of the controlling step that produces a desired droplet size distribution in and for substantially the duration of the discharge. Dorkin fails to disclose adjustment of the mass flow rate of the liquid so as to achieve this limitation of claim 19 and the claims that depend from it.

§103 Rejections

Claims 30 and 31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dorkin in view of Russwurn (US 6,173,790). Applicants respectfully traverse this rejection. As discussed above, Dorkin fails to disclose or suggest every limitation of claims 4 and 18. Russwurn fails to remedy the deficiencies of Dorkin as it relates to claims 4 and 18. Therefore, claims 30 and 31 are allowable for at least the reason they are dependent upon an allowable base claim. Applicants do not otherwise concede the correctness of this rejection.

In view of the above, Applicants request reconsideration of the application in the form of a Notice of Allowance. If a phone conference would be helpful in resolving any further issues related to this matter, please contact Applicants' attorney listed below at (612) 371.5387.

Respectfully submitted,
MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
(612) 332-5300

Date: April 30, 2007

/Joshua N. Randall/
Name: Joshua N. Randall
Reg. No.: 50,719